Silky **Singh**

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Education

Jun 2026 | **Stanford University** — **California, US**
Sep 2024 | MS in Computer Science (AI Specialization)

May 2022 | **Indian Institute of Technology Delhi (IIT Delhi)** — **New Delhi, India**
Jul 2018 | B.Tech. in Mathematics & Computing | CGPA: 9.53/10.0 (class rank ∼ 4/44)
Thesis: "Deep Neural Network approximation for Image Denoising"

Research & Work Experiences

Stanford Vision and Learning Lab (SVL) — Stanford, CA
Graduate Student Researcher | *Advisors: Zane Durante, Prof. Ehsan Adeli, Prof. Fei-Fei Li* — Sep 2024 - present

- Working on Vision-Language models (VLMs) for long form video understanding

Adobe Inc. | Media and Data Science Research (MDSR) — Noida, India
Research Associate | *Advisors: Balaji Krishnamurthy, Mausoom Sarkar* — Jun 2022 - Jul 2024

Exemplar-based Image Editing

- Collaboratively proposed an optimization-free pipeline for exemplar-based image editing using pretrained text-to-image diffusion models. Outperformed existing baselines on multiple metrics while being ∼4x faster (ECCVW'24)

Style Transfer in images

- Proposed and developed an end-to-end pipeline for localized text-conditioned style transfer in images, leveraging multimodal models like LLaVA, SAM and CLIP. (Paper (CVPRW'24), US patent in filing)
- Collaboratively designed a novel relational loss for improved text-conditioned style transfer. (Paper in review)

Form Structure Extraction and Document Understanding

- Co-developed a novel method to propagate error corrections in a Forms corpus via similarity matching (US patent filed)
- Co-led the training and evaluation of document structure extraction models (YOLO, mmdetection) on custom Forms dataset of ≈50K images; integrated into the Automated Forms Conversion Service available to AEM Forms customers.

Object Segmentation in Videos and Images

- Designed and developed a self-supervised framework (LOCATE) for foreground object segmentation in videos and images; surpassed SOTA on multiple standard benchmarks (Paper (BMVC'23), US patent filed)
- Leveraged a combination of motion and appearance information in graph-cut for zero-shot object discovery; favorable to SOTA performance in unsupervised Video Object Segmentation (VOS) (Paper (CVPRW'23), US patent filed)

Adobe Research | Big Data Experience Lab (BEL) — Bengaluru, India
Research Intern | *Advisors: Dr. Kuldeep Kulkarni, Aniruddha Mahapatra* — May 2021 - Aug 2021

- Co-proposed a new problem of context-aware object insertion in a source image from a given exemplar image.
- Curated a natural dataset (≈50K source-exemplar-output triplets) for car objects using Mapillary as the base dataset
- Repurposed state-of-the-art SPADE network to build an end-to-end GAN-based pipeline; more recently, finetuning diffusion-based models for the task – Paint-by-Example, Affordance insertion, IMPRINT (work in progress)

Max Planck Institute for Software Systems | Programming Languages & Verification — Kaiserslautern, Germany
Research Fellow | *Advisors: Prof. Eva Darulova, Anastasiia Izycheva* — Jan 2021 - Apr 2021

- Extended the enumerative synthesis approach for floating-point (FP) and real-valued programs given user constraints
- Repurposed BESTER to synthesize Abstract Syntax Tree (AST) nodes; and verified these programs using SMT solvers (z3)
- Successfully synthesized FP programs for 13/22, and real-valued programs for 19/22 benchmarks (within ≈ 1 hr)

MateRate Education Pvt. Ltd. (incubated at IIT Delhi) — New Delhi, India
Front-end Developer — May 2020 - Jul 2020

- Developed frontend for student, teacher & principal portal in ReactJS as part of the ed-tech web development team.

Publications

S=In Submission, C=Conference, W=Workshop

[W.3] **Towards Efficient Exemplar Based Image Editing with Multimodal VLMs**
Avadhoot Jadhav*, Ashutosh Srivastava*, Abhinav Java, **Silky Singh**, Tarun Ram Menta, Surgan Jandial, Balaji K
ECCV workshop, AI for Visual Arts (AI4VA) 2024

[W.2] **LEAST: "Local" text-conditioned image style transfer**
Silky Singh, Surgan Jandial, Simra Shahid, Abhinav Java
CVPR workshop, AI for Content Creation (AI4CC) 2024 [arXiv | code]

[C.1] **LOCATE: Self-supervised Object Discovery via Flow-guided Graph-cut and Bootstrapped Self-training**
Silky Singh, Shripad Deshmukh, Mausoom Sarkar, Balaji Krishnamurthy
British Machine Vision Conference (BMVC) 2023 [paper | poster | code]

[W.1] **FODVid: Flow-guided Object Discovery in Videos**
Silky Singh, Shripad Deshmukh, Mausoom Sarkar, Rishabh Jain, Mayur Hemani, Balaji Krishnamurthy
CVPR workshop, L3D-IVU 2023 [arXiv | poster]

US Patents

- **Silky Singh**, Surgan Jandial, Simra Shahid, Abhinav Java. Mask-CLIPstyler: Localized text-based style transfer in images. *(to be filed by Nov 2024)*
- **Silky Singh**, Shripad Deshmukh, Mausoom Sarkar, Balaji Krishnamurthy. Generating image object segmentations utilizing graph-cut partitioning in self-supervised object discovery. *(filed, Sep 2023)*
- **Silky Singh**, Shripad Deshmukh, Mausoom Sarkar, Rishabh Jain, Mayur Hemani, Balaji Krishnamurthy. Video Object Segmentation using estimated motion information and image features. *(filed, Aug 2023)*
- **Silky Singh**, Shripad Deshmukh, Surgan Jandial, Abhinav Java, Milan Aggarwal, Mausoom Sarkar, Arneh Jain, Balaji Krishnamurthy. Personalized form error correction propagation. *(filed, Apr 2023)*

Honors and Awards

Dr. Ram Prakash Bhatia Excellence Award, 2022 outstanding B.Tech. female student, Dept. of Mathematics, IIT Delhi

IIT Delhi's Semester Merit Award, 2018-22 Awarded for being amongst top 7% in Fall 2018, Fall 2021 & Spring 2022

B-83 Merit Award, 2021 Received for outstanding academic performance from the alumni batch of 1983 at IIT Delhi

Notable Contribution Award, 2021 Received the award from Office of Career Services, IITD for exemplary performance as Nucleus Coordinator managing the training & placement activities of 200+ students in the Mathematics department

Mrs. Malti Singh and Shri Ram Rishi Singh Memorial Scholarship, 2019-21 for outstanding academic performance

Top 0.5% in JEE Advanced, 2018 All India Rank (AIR) 830 in national competitive examination for entrance to IITs

Top 0.2% in JEE Main, 2018 Secured All India Rank of 1601 (top 0.2%) among ∼1.5 million students across India

Merit Certificate, 2016 from Central Board of Secondary Education (CBSE) for excellent performance in AISSE exams

Academic Service

Reviewer/Sub-Reviewer	CVPR'24, CVPRW'24 (L3D-IVU, AI4CC), WACV'25
Teaching Assistant	Linear Algebra and Applications *(Spring 2022, IIT Delhi)*
	Introduction to Computer Science *(Fall 2021, IIT Delhi)*
Academic Mentor	Linear Algebra & Differential Equations *(Fall 2019, IIT Delhi)*

Technical Skills

Languages/Frameworks Python, PyTorch, C++, C, Java, Scala

Software/Libraries VS Code, Jupyter Notebooks, Git, LaTeX, MATLAB, Octave GNU, numpy, opencv, Pillow (PIL)

Select Coursework Machine Learning [🔗], Calculus, Linear Algebra, Probability & Stochastic Processes, Analysis and Design of Algorithms, Data Structures & Algorithms [🔗], Numerical Analysis, Intro. to Computer Science, CS231- Convolutional Neural Networks for Visual Recognition by Stanford (MOOC), Machine Learning by Andrew Ng (Coursera)